Notice of Allowability	Application No.	Applicant(s)	
	10/736,006	KIRK ET AL.	
	Examiner	Art Unit	
	Joni Hsu	2671	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *papers received December 16, 2005*.

2. ☒ The allowed claim(s) is/are *1, 4-9, 11-20, 26-32*.

3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
   a) ☐ All b) ☐ Some* c) ☐ None of the:
      1. ☐ Certified copies of the priority documents have been received.
      2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
      3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
      1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
   (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

DETAILED ACTION

Response to Amendment

1. Applicant's arguments, see pages 9-10, filed December 15, 2005, with respect to Claims 1, 4-9, 11-20, and 26-32 have been fully considered and are persuasive. The 35 U.S.C. 102 rejections of Claim 7 and the 35 U.S.C. 103 rejections of Claims 1, 4-6, 8, 9, and 11-20 has been withdrawn.

Allowable Subject Matter

2. Claims 1, 4-9, 11-20, and 26-32 are allowed.

The following is an examiner's statement of reasons for allowance:

3. The prior art taken singly or in combination do not teach or suggest a fragment processing unit associated with a conflict detection unit comprising updating the conflict detection unit when the pending write to the location is completed, as recited in Claim 1. Claims 4-6, 26-28, 29, and 32 depend from Claim 1, and therefore also contain allowable subject matter.

A method for processing fragments comprising determining in a conflict detection unit that a write to a location in a buffer utilized in the processing is pending prior to reading the location in the buffer; storing an instruction for processing the first fragment waiting for the write to complete; processing another fragment as specified by the fragment program while waiting for the write to complete; and processing responsive to the conflict detection unit, the first fragment in the fragment processing unit as specified by the fragment program upon

determining that the write to the buffer location is complete, as recited in Claim 7. Claims 8, 9, and 11 depend from Claim 7, and therefore also contain allowable subject matter.

A programmable graphics processor comprising a conflict detection unit configured to selectively store at least a portion of a position associated with a plurality of fragments and generate a position conflict status for each of the plurality of fragments; a read interface responsive to the positions stored by the conflict detection unit and configured to read data associated with one of the positions from a graphics memory and output the data to a fragment processing unit, as recited in Claim 12. Claims 13-19, 30, and 31 depend from Claim 12, and therefore also contain allowable subject matter.

4. The closest prior art (Duluk 1 US006288730B1) teaches a method of processing graphics data in a graphics processing unit (Col. 5, lines 14-17) including a fragment processing unit (Col. 7, lines 60-62) associated with a conflict detection unit and a buffer (1216, Figure 2) comprising receiving fragments, a fragment associated with a location in the buffer (Col. 8, lines 19-51); tracking in the conflict detection unit a pending write to the location in the buffer (Col. 14, lines 19-24); shading at least a portion of the fragments to produce shaded fragment data (Col. 8, lines 14-18). For additional shading operations, the operation first waits to read the location in the buffer until the pending write to the location in the buffer is completed (Col. 14, lines 24-27). After it is completed, the buffer access is allowed, so then the shading block shades the fragment using data read from the location in the buffer to produce additional shaded fragment data (Col. 8, lines 14-18). However, Duluk 1 does not teach updating the conflict detection unit when the pending write to the location is completed, processing another fragment as specified by the

fragment program while waiting for the write to complete, or that the conflict detection unit is configured to selectively store at least a portion of a position associated with a plurality of fragments and generate a position conflict status for each of the plurality of fragments.

5. Another prior art (Duluk 2 US006771264B1) teaches writing the shaded fragment data (*performs phong shading for each pixel fragment*, Col. 44, lines 51-61) to at least one location in the buffer (*BKE bus writes into the frame buffer memory*, Col. 112, line 64-Col. 113, line 4), as shown in Figure 9. This is done for every shaded fragment, so it includes writing the additional shaded fragment data to a location in the buffer. Duluk 2 also teaches a write interface configured to write the processed fragment to the graphics memory (Col. 44, lines 51-61; Col. 112, line 64-Col. 113, line 4), as shown in Figure 9. However, Duluk 2 does not teach a conflict detection unit.

6. Another prior art (Holmes US006490635B1) teaches that the tracking comprises entering the location associated with the pending write in a conflict detection unit (*conflict detection method comprises the steps of decoding a first command, where the first command is a queued read or a write, and reading an associated first logical block address and first block count (LBA), where the first LBA and the first block count define a first address range*, Col. 3, lines 2-6); and updating the conflict detection unit when the pending write to the location is completed (*the conflict detection method also comprises the step of clearing the conflict flag upon completion of the first command*, Col. 3, lines 53-56). However, Holmes does not teach processing fragments.

7. Another prior art (Bauman US005875472A) teaches processing a first request; determining in a conflict detection unit that a write to a location in a buffer utilized in the processing is pending prior to reading the location in the buffer (Col. 16, lines 63-67); storing an instruction for processing the first request waiting for the write to complete; processing another request while waiting for the write to complete (Col. 4, lines 39-44); reading, responsive to the conflict detection unit, the location in the buffer; and processing responsive to the conflict detection unit, the first request upon determining that the write to the buffer location is complete (Col. 17, lines 1-2, 14-19; Col. 21, lines 40-48). Bauman also teaches a conflict detection unit configured to selectively store at least a portion of a position associated with a plurality of requests and generate a position conflict status for each of the plurality of requests (Col. 15, lines 1-16). However, Bauman does not teach processing fragments.

8. Another prior art (Wood US006204856B1) teaches that the fragment program performs depth buffering prior to shading (Col. 1, lines 22-24; Col. 9, lines 64-67; Col. 12, lines 1-6). However, Wood does not teach a conflict detection unit.

9. Another prior art (Isard US 20040207623A1) teaches that the fragment program performs depth peeling [0017, 0055]. However, Isard does not teach a conflict detection unit.

10. Another prior art (Aglietti US006567907B1) teaches that the conflict detection unit includes a hash unit (30, Figure 1; Col. 3, lines 4-12). However, Aglietti does not teach a programmable graphics processor.

11. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Prior Art of Record

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

1. Duluk 1 (US006288730B1) teaches a fragment processing unit (Col. 7, lines 60-62) associated with a conflict detection unit (Col. 14, lines 19-24).

2. Duluk 2 (US006771264B1) teaches a method for performing tangent space lighting in a three-dimensional graphics processor implementing deferred shading features (Col. 1, lines 9-13).

3. Holmes (US006490635B1) teaches a conflict detection method for a disk drive controller (Col. 2, lines 65-66).

4. Bauman (US005875472A) teaches an address conflict detection and resolution system that allows each requester in the system to continue making read requests to cache as long as a first predetermined number of read requests are not pending from that requester to main memory (Col. 4, lines 14-20).

5. Wood (US006204856B1) teaches that the fragment program performs depth buffering prior to shading (Col. 1, lines 22-24; Col. 9, lines 64-67; Col. 12, lines 1-6).

6 Isard (US 20040207623A1) teaches a programmable fragment shader [0017].

7 Aglietti (US006567907B1) teaches a mechanism for avoiding mapping conflicts in a translation look-aside buffer (Col. 1, lines 57-58).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Joni Hsu whose telephone number is 571-272-7785. The examiner can normally be reached on M-F 8am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ulka Chauhan can be reached on 571-272-7782. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JH

ULKA CHAUHAN
SUPERVISORY PATENT EXAMINER